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The Bristol Medico-Chirurgical Journal

" Scire est nescire, nisi id me
Scire alius sciret."

OCTOBER, 1923.

A FILM METHOD FOR DETERMINING THE REACTION OF THE LIQUIDS OF THE BODY BY INDICATORS.

BY

GEORGE A. BUCKMASTER, M.A., M.D. Oxon.,

Professor of Physiology in the University of Bristol.

A LARGE body of evidence has accumulated in support of the electrolytic dissociation theory originally put forward by Arrhenius in 1887, and at the present time the conception of the reaction of a solution, whether acid, alkaline or neutral, is to be regarded either from the point of view of the absolute quantity of neutralisable acid or alkali present, or from the relative concentration of the hydrogen and hydroxyl ions of the solute present in the solution. Therefore in the former case the acidity of a normal solution has been defined as the equivalent of 1 gram atom of acidic hydrogen in 1 litre of solution, and in the latter case a normal solution of hydrogen ion as one containing 1 gram

atom of hydrogen ions in a litre of solution. Normal acid contains variable quantities of acid according to the quantity of solution examined, but when ionic hydrogen is the participant in any reaction, the concentration of hydrogen ions is the same in any quantity, great or small, of the solution. A minute amount of liquid possesses the same H^+–concentration as the whole of it. On this fact depends the possibility of applying electrometric or colorimetric measurements to drops of liquid. The latter method is dependent upon the former, and in colorimetric determinations we are indirectly using the former.

It is possible to form a conception of the hydrogen ion. It is a colourless substance, unique among other ions, since the element hydrogen is considered to possess only a single electron or unit negative charge to the atom. When this electron is lost by the atom there remains a solitary unit positive charge. This is hydrogen ion H^+. All ions move with specific velocities. All ions are hydrated.

All experimental methods possess inherent errors. According to some observers the error with colorimetric determinations for blood is less than with the hydrogen electrode, but except for research, the former method will always remain the one for ordinary use in physiological or clinical laboratories.[1] The colorimetric method for ascertaining the PH of the liquids of the body depends on the use of buffer mixtures which vary in PH, and which have been standardised by hydrogen-electrode measurements. Test-tubes of equal diameter or small bottles with flat polished sides, holding equal volumes of liquid, so arranged

[1] The standard work in English on methods is *The Determination of Hydrogen Ions*, by Mansfield Clark, 2nd edition, 1922. In this will be found full explanations of indicator methods and the reasons for expressing the hydrogen ion concentrations of solutions as PH values; these are, in fact, the negative exponents as whole numbers of the actual hydrogen-ion concentrations. The introduction of PH as a value is due to Sörensen (1909).

in a comparator that standards of known PH can be used for comparison with the liquid, the unknown PH of which can be ascertained by the use of indicators of suitable range, is the usual method of work, but others may be mentioned. Many of the sulphonephthalein group of indicators which give such good results when used in solutions cannot be used for the preparation of stable indicator papers, either sized or unsized, not even if every precaution is taken to keep them in an atmosphere free from carbon dioxide and to protect them from light (A. R. C. Haas). The examination of drops of liquid mixed with drops of indicator upon a highly reflecting surface of opal glass has been suggested by L. D. Felton as a method which is useful for highly-coloured liquids, or where only a little material is available. A feature of this method is the employment of 25 per cent. alcoholic solutions of selected indicators; this facilitates the mixing of the indicator with the drop of buffer solution or solution of which the PH is to be determined. The buffer solutions used were the Clark series, which if kept carefully in glass bottles remain unchanged for two months.

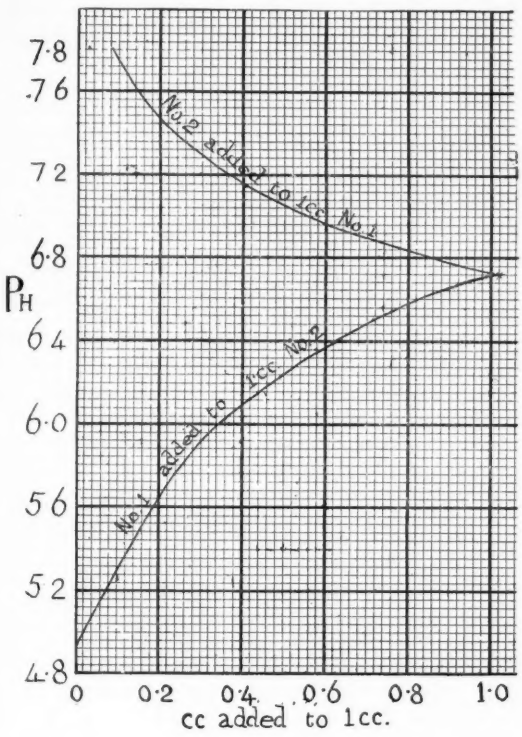
It seemed to me of interest to try whether films of solutions, of urine, plasma, serum, bile or skimmed milk could be used with suitable indicators, and the tints matched with similar films of buffer solutions of known hydrogen-ion concentrations. I found it quite impossible to hold films of these liquids for longer than a minute on rings made of wire. Several kinds of metal, and wire of varying gauge were tried in order to obtain, if possible, durable films. All these attempts were unsuccessful. However, by the use of celloidin rings it is possible to obtain films which will last for half an hour or even an hour, which gives ample time for work. Provided that the area of the ring bears a particular ratio to the breadth of the ring, the formation of

a film and its preservation for a long time is possible, indeed quite a simple procedure. I have found that the following dimensions of the celloidin rings give the best results: Diameter of the ring, 14 mm.; opening of the ring, 11 mm.; actual breadth of the ring, 3 mm. The whole ring is carefully cut out from a sheet of celloidin 0.25 mm. thick. It is somewhat larger than a threepenny-piece, and is attached to a handle of celloidin about 6 cm. long. The liquid held in the ring must form a flat film, not a drop. The average weight of a urine film is 0.0154 grammes, and its thickness 0.162 mm. Rings, when not in use, are kept clean by soaking in distilled water. In carrying out this method only indicators in aqueous solutions should be used. Any percentage of alcohol in the indicator over 6 per cent. ruptures the film.

The buffer solution used is the one which has been devised by T. C. McIlvaine.[1] Only two stock solutions are required; 0.2 M (3.56 per cent.) disodium phosphate $Na_2HPO_4+2H_2O$, and 0.1 M (2.1 per cent.) citric acid $C_6H_8O_7+H_2O$. The range of PH extends between 2.2 and 8.0, but a range between 4.9 and 7.8 suffices for the reaction of most of the body liquids. I am indebted to Dr. Millicent Taylor for the construction of the accompanying graph. From this the proportions of the two stock solutions can be at once read off, which will give any PH value desired within the limit range.

The film method lends itself easily to determinations for urine, sweat, bile, saliva, and with certain precautions to milk. The method applied to blood is a special one. It requires smaller celloidin rings, the corpuscles are allowed to gravitate off the film, and the whole procedure must be carried out in an atmosphere with a percentage of carbon dioxide between 5 and 6 per cent.

[1] *J. Biol. Chem.* 1921, xlix., 183.



Curve giving PH for mixtures of 0.2 m, Na_2HPO_4 and 0.1 m. Citric Acid.

Solution No. 1 is 0.2 m, Na_2HPO_4.

Solution No. 2 consists of a mixture of equal volumes of 0.2 m, Na_2HPO_4 and 0.1 m. Citric Acid.

Values for PH used in constructing this curve were calculated from the values given by McIlvaine, *J. Biol. Chem.* (1921), xlix. 184, 185.

Since the method is so easily applicable to urine, the exact procedure of the test with this may be described. Thin celloidin rings are used. They are held horizontal in an easily-constructed apparatus, which consists of a plate of opal glass at an angle of 45° to reflect the light from an

electric lamp through the film to the eye. A wooden box, blackened inside, with a hole 5 cm. in diameter at the top, cuts out extraneous light.

Since urines range between an acidity of PH5 and PH7, brom-cresol purple (0.04 per cent. aqueous solution) with a range from yellow (PH5.3) to purple (PH6.5) is the accepted indicator for general use. Differences of 0.2 PH are easily read with practice. Brom-thymol blue (0.4 per cent. in aqueous solution) with a range of PH 6—7.6, yellow to green, blue to blue-green can be used for less acid urines. For more acid urines .02 per cent. methyl-red in 13 per cent. of alcohol, to which a trace of saponin is added, can be used.

A film of urine is picked up on a celloidin ring and a small drop of the indicator allowed to fall on the film. It is easy to mix the liquids completely without breaking the film by gentle shaking with a circular movement. The exact tint is now matched with a standard buffer solution similarly held as a film with the same sized drop of indicator. The standard is made with the help of the graph. Two burettes reading to $\frac{1}{10}$ c.c. hold the two stock solutions. Accuracy is possible to differences of 0.2 PH or even less. If the films are properly made, those of the urine and buffer solution are of equal mass; but to obtain equality of the size of the drop of indicator is not so easy, and I find the pipettes supplied with the drop bottles suggested by Dreyer useless. A form of simple dropping pipette without any rubber teat, which like Traube's stalagmometer delivers uniform drops, may be used, and the drop delivered should be a small one. Latterly I have entirely discarded this mode of adding the indicator, for it is easy to take up an equal quantity of this on another celloidin ring and mix the urine film and indicator film together. Even when the indicators are dichroic, the film, if properly made, is practically without any dichroism.

The following table gives the hydrogen-ion concentrations of various liquids of physiological interest. These values are stated directly in terms of normality (N) and the derived PH notation :—

	CH	PH
Alkalinity.		
Na_2HPO_4, ($\frac{M}{10}$) 0.000000001 = 1×10^{-9}		9
Pancreatic juice, 0.00000001 = 1×10^{-8}		8
Blood, 0.00000038 = $.38 \times 10^{-7}$		7·4
Blood limits comparable with life		7·7—7
Blood variation between arterial and venous blood		0.02
Neutrality.		
0.0000001 = 1×10^{-7}		7
Acidity.		
Milk, human, 1.07×10^{-7}		6.97
Milk, cow, 2.7×10^{-7}		6.59
Sweat (work), 6×10^{-7}		6.22
Sweat (heat), 1.8×10^{-7}		5·73
Urine, 0.0000001 = 1×10^{-7}		7.0
Urine, 0.00001 = 1×10^{-5}		5.0
NaH_2PO_4, ($\frac{M}{10}$) 0.0001 = 1×10^{-4}		4

ON THE DIAGNOSIS AND TREATMENT OF DIABETES MELLITUS, WITH SPECIAL REFERENCE TO THE USAGES OF INSULIN.

BY

A. T. TODD, M.B., Ch.B. Edin., M.R.C.P. Lond.,

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THE possibility of a diagnosis of diabetes usually arises on the finding of a reducible substance in the urine; glucose is but one of these, and some test must be made to differentiate it from the others, of which the most frequent are :—

Uric acid, hippuric acid, salicyluric acid present in salicylate therapy, glycuronic acid present after chloral, etc.; alkapton, creatinine, lactose during lactation; pentose—in pentosuria.

A simple means of differentiation is possible in the fermentation test, provided certain precautions are taken :—

(i.) Glucose fermenting bacteria are common in urine; these bacteria will produce gas from other substances than glucose; to destroy them the apparatus and the urine must be carefully sterilised by boiling.

(ii.) There may be fermentable substances in the yeast itself; an aqueous extract should be tested by fermentation of the yeast.

(iii.) Brewer's yeast should be used; baker's yeast sometimes contains other fungi.

A more accurate method is to prove the presence of the osazone derivative.

Glycosuria having been proved, the next step is to determine whether it is diabetic or not. To this end the

examination of the blood sugar is the simplest and most reliable method.

Under normal conditions glucose is present in the blood at a concentration of about 100 milligrams, or 0.1 per cent. The amount varies with the state of health (Curve I.), with emotion, exertion and fatigue, but only within narrow limits. The greatest variation is that which is found to occur shortly after taking food. This is seen in the blood sugar curve, a graph constructed from the sugar values at definite periods before and after a test meal. Normally a short positive wave is found, of definite shape and duration. This is termed the alimentary glycæmia wave (Curve II.).

It is seen that the sugar value rises sharply to 140 or 150 milligrams, it then as rapidly sinks, reaching its fasting level, or a slightly lower one, at 90 minutes from the taking of the meal. The height of the peak is not strictly related to the amount of carbohydrate present in the test meal; the same response may be found after two ounces of lean beef as after four ounces of pure glucose.[1]

The explanation of this alimentary wave is still obscure. It might be suggested that the increase of sugar was due to the temporary lack of pancreatic hormone in the blood-stream, that the pancreas was somewhat sluggish in relation to storage of absorbed carbohydrate. That such an explanation is inadequate is obvious from the facts that :—

(1) The height of the glycæmia is independent of the amount of carbohydrate ingested.[1]

(2) If at the depression of the wave another carbohydrate meal is given there is no second wave, except in diabetes.[1]

(3) Glucose administered per rectum does not produce an alimentary wave.[2] In this case the glucose is not absorbed into the portal circulation. It would appear from this latter observation that the liver is important in the storage and metabolism of glucose. A consideration of the experimental

and clinical work undertaken to explain the alimentary glycæmic wave is quite beyond the scope of this article; those interested in this aspect of the subject may find it of value to consult the following references: [1, 2, 3, 4, 5, 6].

The most important features of the normal blood sugar curve are:—

(i.) The peak of the wave lies below the 200 milligram line.

(ii.) Subsidence is rapid; in 90 minutes the fasting level is attained.

It should be noted that the term glycæmia, or amount of sugar in the blood, tends to be restricted to values between 50 and 200 milligrams. If less than 50 milligrams the term hypoglycæmia is used; if more than 200 milligrams the condition is called hyperglycæmia.

In diabetes it is found that the blood sugar curve is abnormal:—

(i.) The fasting sugar level is frequently set high. It may exceed 200 milligrams per cent.

(ii.) The peak of the wave rises above the 200 milligram line. Hyperglycæmia is present at some time.

(iii.) The wave subsides more slowly than in health; the fasting value is rarely attained before 120 minutes.

These features are obvious in Curves III., IV., V. and VIII.

This type of curve occurs in diabetes only, and is recognised as the "diabetic curve." Few of the many conditions associated with glycosuria yield the same definite curve, but there are several apparent similarities which call for mention.

(i.) In the early months of pregnancy, and occasionally during menstruation, glycosuria may be found; in the former condition a border-line curve may be met.[1]

(ii.) In hyperthyroidism and Graves' disease all transitions between normal and diabetic curves are found. This is to

be expected when the depressant action of the thyroid gland on the pancreas is remembered. Moreover, diabetes preceding or following Graves' disease is not infrequent.[7] In most cases of hyperthyroidism, however, the glycæmia is normal.[8] If the clinical features plus the blood sugar curve are not sufficiently diagnostic then the following procedures are indicated :—

(*a*) Basal metabolism, the patient should not be starved too long before the analysis is made. In hyperthyroidism the value is consistently high. In diabetes the value is reduced, normal or slightly raised.[6]

(*b*) Depression of the thyroid by X-radiation should result in a normal blood sugar curve, if the condition is due to thyroid activity.

(*c*) Cammidge states that a study of the hydrolysable glucose values may be of help in this differential diagnosis.[9]

(iii.) In parenchymatous nephritis and occasionally in mixed parenchymatous-interstitial nephritis a diabetic curve is sometimes encountered. The great majority of these cases exhibit increased tolerance for sugar, and glycosuria only appears after very large amounts of glucose given by the mouth, seldom until the intake exceeds 100 grammes. Nephritis will rarely give rise to difficulty.[10]

One or two conditions not included in diabetes mellitus, but which give rise to glycosuria, are worthy of consideration :—

Renal diabetes, diabetes innocens. In these cases glycosuria is present, but other symptoms are slight or absent. The blood sugar is found to be normal (Curve VI.). The condition appears to be due to the kidney epithelium allowing glucose to leak into the urine at abnormally low levels—the sluice for glucose is set a little lower. It was suspected that this condition might be an early stage of true diabetes, but cases have been observed for many years, and

no such transition has been noted.* Most of the pregnancy and menstruation glycosurias fall into this group.

Border-line cases.—Here diagnostic difficulty will be met. Glycosuria may be discovered accidentally, or the family history may suggest the possibility of diabetes. Symptoms are usually absent. The glycæmia is found to be intermediate between the normal and diabetic type, and sugar tolerance is diminished (Curve VII.).

In these cases difficulty is of little importance, for the condition is mild diabetes and should be so treated. If this be not done, there is great risk of true diabetes developing. Graham reports one case in which transition did occur.[8]

Collection of blood for diagnosis.—The micro methods are applicable only in cases where the pathologist can attend and deal with the case. For general practice it is advised that about 0.5 to 1.0 c.c. (or one-third to one-half of a drachm) be taken. This amount is most readily obtained from a superficial vein, but multiple puncture of congested finger-tip or ear lobe will frequently yield so much blood; vein puncture, if performed with a sharp, well-polished needle, is probably the less painful method.

Coagulation of the blood alters the glucose value,[11] and also interferes with the technique of glucose estimation. To prevent this a small amount of potassium oxalate should be placed in the blood-receiving tube; this combines with the plasma-calcium and prevents coagulation. The oxalate should be in powder form and sterile; the tube should be provided with a rubber stopper so that the contents can be well shaken to ensure a good solution. There are objections to oxalate,[19] but also a fair number of advantages. About one half-grain of oxalate is quite sufficient.

The estimation of the blood sugar should be made as soon as possible after drawing the blood, for it is found that the

* Parkes Weber's case, 35 years; Sir A. Garrod's case, 9 years.

sugar gradually disappears, and after four hours at room temperature there is frequently a decided loss. If delay is expected, or the specimen is to be sent away by post, then a measured amount of blood is to be added to a known volume of alcohol. Special outfits are procurable for this purpose.

A complete curve is unnecessary, except for a doubtful or border-line case. Two samples, one of the fasting blood and the other at a definite time after the meal, are quite sufficient in about 95 per cent. of the cases.

The fasting blood is taken before breakfast, or at least five hours after the last food or drink. The second specimen should be taken exactly 90 minutes after the meal; some advise two hours as the best time for taking this specimen, but it will be seen from Curve VIII. that a slight case which was evident at 90 minutes might be missed at two hours.

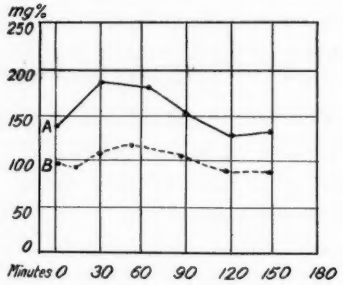
The composition of the test meal is not of great importance, provided fats be excluded, for fats delay absorption. The simplest meal is 50 gms. (2 ozs.) of glucose in a large tumbler of water or black coffee. Honey may be used instead, and is rather less objectionable, but more must be given. Cheap commercial jam contains about 50 per cent. of glucose, and is readily obtained.

If in either of these specimens a glucose value of 200 milligrams or more is reported the condition can be regarded as diabetes mellitus, with reservations for the exceptions noted above. In a small number of cases the result will be doubtful and the complete curve will be necessary.

Having made a diagnosis, the question of insulin administration will be next considered. Here we are concerned with the dosage and not the indications for insulin.

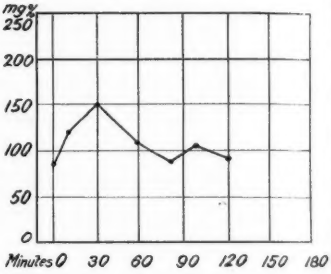
Methods are now being described which are said to obviate blood analysis; this appears to be regrettable,

CURVE I.



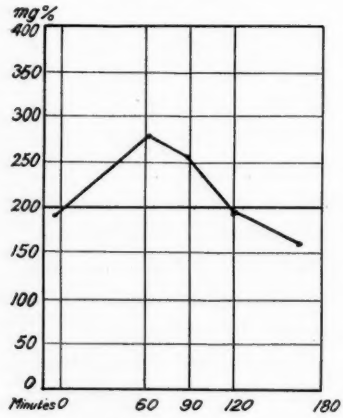
Showing effect of fatigue. Curve A is of blood before a holiday. Curve B, blood after holiday. Upper curve is almost of border-line type. (*Graham.*)

CURVE II.



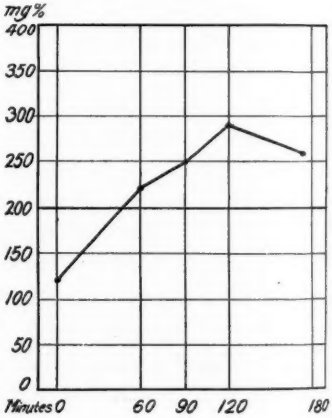
Typical normal alimentary ware.

CURVE III.



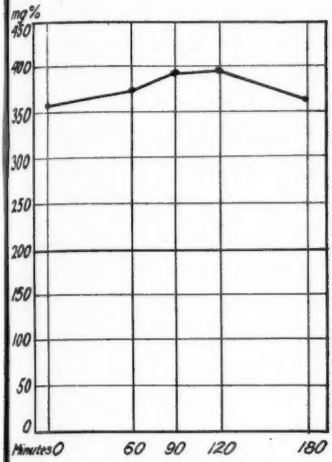
Diabetic Curve.

CURVE IV.



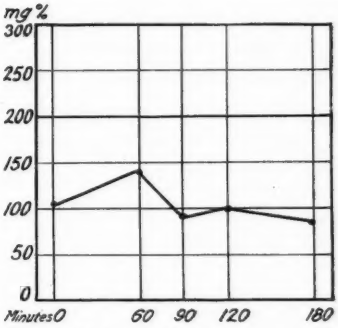
Diabetes.

CURVE V.



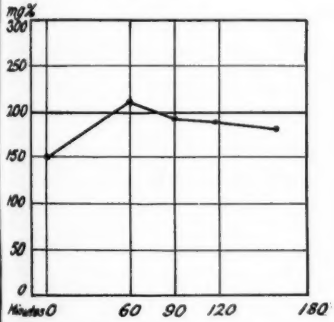
Severe Diabetes.

CURVE VI.



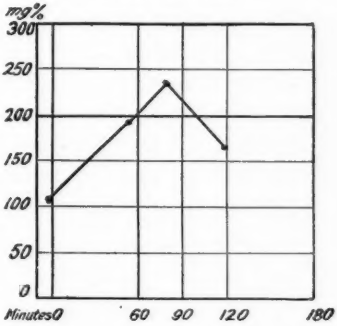
Renal Diabetes : blood sugar normal.

CURVE VII.



Border-line curve.

CURVE VIII.



Mild Diabetes : blood taken at two hours would miss diabetic value. (From MacLean.)

because there is a good deal of experimental and clinical work which seems to show that the blood sugar must be kept at a definite low level if the best results are to be obtained from insulin.[1 2] The new methods mostly consist in observing when glycosuria appears in relation to the amount of carbohydrate in the diet. Under normal conditions sugar appears in the urine when the blood sugar reaches 170–180 milligrams per cent.; this value is termed the threshold value or leak point, for leakage into the urine will then prevent hyperglycæmia from occurring, and so protect the sensitive islet cells of the pancreas.

Now in diabetes the threshold value is usually found to be set at a much higher level than in health, and leakage only occurs at values of 200–300 milligrams per cent. This raising of the threshold value is frequently regarded as being protective, inasmuch as it would tend to retain glucose in the body, but in view of the experimental work by Allen it would be safer to say that such an explanation is not correct. The presence of hyperglycæmia in parenchymatous and mixed nephritis would appear to show that the raising of the threshold is due to damage of the tubular or glomerular renal epithelium; in diabetes the raised threshold should be regarded as one point in a vicious circle (*vide* Note I.).

From observation of the urine only one is unable to obtain any exact idea as to the condition of glycæmia in diabetes; there may be no glycosuria at blood sugar levels between 50–300 milligrams per cent.

Allen's work on diabetic dogs, with Graham's and Leyton's clinical observations, seem to prove that the blood-sugar should be kept at a level of about 130 milligrams per cent. It was found that a mild case of diabetes could be converted into a rapidly fatal one by keeping the blood-sugar at a high level. Histologically easy proof of this was forthcoming. The β cells of the pancreas islets were found

to have lost their granules, to become vacuolated and show dislocation of the nucleus; some of the cells were atrophic, being replaced by fibrous tissue. The β cells appear to be those concerned with carbohydrate metabolism. There is reason to believe that the cells which are not injured too greatly may recover if hyperglycæmia is prevented.[13] Moreover, in diabetic dogs evidence has been obtained to show that regeneration of islet tissue occurs under favourable conditions.[14]

There is no doubt that considerable temporary improvement will follow the use of insulin in the great majority of cases of diabetes, even though the blood-sugar is not carefully controlled; the patients put on weight and feel much improved, but such treatment must be regarded as purely palliative and probably harmful in the long run. From the short account of the experimental work, confirmed by several other observers, it appears to be hopeless to expect anything more than temporary amelioration unless the hyperglycæmia is rigidly controlled.

The first step in the dosage of insulin is to draw up a diet based upon the height, age and occupation of the patient. Many diet scales are available, and the formation of a diet is readily accomplished. The occupation of the patient is of considerable importance, and allowance must be made for this. A patient who must work while under treatment requires sufficient calories for this work in addition to the basal requirements. Growth must be allowed for in young subjects.

The carbohydrate of the daily diet should be divided into two equal parts, and given at two meals only, before which the insulin should be injected. It is advised that one of these meals be breakfast, in order that the patient may commence the day with a supply of utilisable carbohydrate. The effects of insulin are maintained for about four and a

half hours in the average case; by giving two doses the effects are spread over the day. Von Noorden recommends that insulin be given four-hourly and three times in the day. This appears to be unnecessary.[15]

The amount to be given is roughly in direct ratio to the intensity of the glycæmia: in an average case five units should be tried first. This dose is given before one of the carbohydrate meals, and after three hours blood is drawn as if for diagnosis. If in this specimen the glucose approaches 150 milligrams the dose is about correct; if not, a five unit increase should be given until the correct dose is found.

In severe cases the amount necessary will be too large for frequent injection, apart from the cost; in certain cases any amount will be inadequate. In these cases, and where monetary considerations preclude the optimum, a less valuable dose must suffice.

The dosage required bears no relationship to the amount of carbohydrate in the diet. It was thought that one unit (old style) would be adequate for 2 gms. carbohydrate.[16] This has been disproved.[15] The quantity required depends upon the amount of functioning power of the patient's pancreas.

Having determined the exact dose, the patient is to be kept on this dose and diet for about two weeks to one month. Then the utility of the dose is again checked. When by the action of insulin the carbohydrate store of the body is partly occupied again, it sometimes happens that a somewhat larger dose is needed for efficient storage to continue.[17] The converse is also found. Von Noorden reports that a diminished dose is sometimes equally effective.[15] Consideration of cost alone will not permit neglect of such a possibility.

After this, provided there is no obvious change in the patient and weight is gained in a satisfactory manner, no further blood analysis is necessary until a change of diet is made. It is advised, however, that the dosage be checked

at intervals, for though improvement in the patient with need for less insulin is not frequent, yet one or two cases have been already described, and such a change for the better is obviously desirable.

With regard to hypoglycæmia, this is not likely to occur in a patient treated on these lines, provided that a meal is not omitted after the insulin injection. The patient and his attendants should be warned to recognise the symptoms of the condition—slight feeling of faintness, restlessness, flushing or pallor and sweating. The remedy, a small amount of carbohydrate taken from the next meal, is usually to hand.

The outlook for insulin therapy is somewhat obscure. That it has advanced the treatment of diabetes is undoubted, but it may be wise to check the optimism inspired by the lay press, lest carelessness in administration and diminution of a possibly helpful psychic effect lead to some discredit of the remedy. At present insulin is used chiefly in the severe cases which are probably beyond cure. In the milder and border-line cases better results may be expected provided accurate dosage of insulin is maintained, but experience and time alone can decide this part of the problem. It is possible that insulin is not the only substance lacking in the diabetic, for Thiroloix[18] has recently shown that when the pancreas is completely extirpated insulin only delays the fatal result. A pancreatic extract made and experimented with by Cohnheim in 1904 was probably effective owing to the insulin present. It was found that this extract was not wholly adequate to deal with carbohydrate metabolism in diabetes. Other extracts of pancreas containing water soluble substances, not present in insulin, were found to be necessary in addition.[8]

Such reservations are necessary, for there is a tendency to believe that a diabetic + insulin = a normal person. It is unlikely that this conception is correct, and at present it is

essential to add correct personal hygiene, diet and glycæmia to the diabetic side of the equation.

NOTE I.—The fixing of the threshold point for glucose is probably not so simple as would appear at first sight. In addition to alteration of the special epithelium by toxic substances, the product of metabolic errors in diabetes, the actual acidity of the blood and the amounts of and relationships between calcium, potassium and sodium ions are of importance. These facts do not militate against the conclusions given above. Those interested should consult the articles dealing with this subject.[20, 21]

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DISORDERS OF DEGLUTITION.

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BEFORE considering the disorders of deglutition it is well to recall certain normal processes involved in this function.

In the laryngo-pharynx the most important mechanism is the closure of the larynx. This is effected by the apposition and tilting forward of the arytenoids and the apposition of the aryepiglottic folds, while a raising of the larynx brings the arytenoids with their cornicula into contact with the cushion of the epiglottis. The contractions in sequence of the middle and inferior constrictors of the pharynx cause the bolus to glide in turn over the posterior surfaces of the epiglottis and the arytenoids and to enter the hypo-pharynx.

According to Chevalier Jackson the bolus is split into two as it passes over the epiglottis, each half passing into the corresponding pyriform sinus and from there into the hypo-pharynx. The hypo-pharynx, or post-cricoid region, is the narrowest part of the pharynx, and its walls are kept in tight apposition by the tonic action of the crico-pharyngeus muscle. The crico-pharyngeus muscle is the specialised lower transverse circular portion of the inferior constrictor. Attached in front to the lateral margins of the signet portion of the cricoid cartilage, it is fixed behind to the median raphe of the pharynx. A large percentage of ingested foreign bodies become impacted in this region, and it is the point

where difficulty in introducing the œsophagoscope is experienced, firm, steady pressure having to be exerted to overcome the tonic action of the crico-pharyngeus.

In the œsophagus the food is definitely passed along by peristaltic action which is under nervous control. These waves can be seen and actually felt in the horse, and are easily demonstrable by skiagraphy with Barium paste in the human subject.

As viewed through the œsophagoscope the upper portion of the thoracic œsophagus is definitely a patent tube, exhibiting clearly respiratory and cardiac movements. The lumen is seen to increase during inspiration and diminish during expiration, while the cardiac movements are transmitted from the adjacent thoracic aorta.

Owing to the thoracic œsophagus not pursuing a straight course the patency of the lumen cannot be seen in its full extent. Starting slightly to the left of the middle line, it then assumes a median position, and finally again inclines to the left ; but besides this it follows the curve of the thoracic spine, and finally proceeds fairly abruptly forward to pass through the diaphragm. It is important to remember these deviations from the straight line in passing the œsophagoscope. The abdominal portion of the œsophagus is one inch in length.

With regard to the presence of a sphincter at the cardiac orifice much dispute reigns. According to Chevalier Jackson no true sphincter is present, but apposition is maintained at the diaphragmatic aperture by the tonic " pinch cock " action of fibres from the crura of the diaphragm, and further that on retrograde œsophagoscopy the cardia and abdominal œsophagus do not seem to exist. I have not had an opportunity to verify this, but there is no doubt that the tendency is, " Where an aperture exists, there shall a sphincter be described."

The presence of a deglutition centre in the medulla controlling this important function is probable, though not proven.

The method I propose to adopt in this paper is to take in sequence the different subdivisions of the digestive tube involved in deglutition, and discuss the disorders in deglutition produced by disease in that particular area.

For purposes of classification I am grouping these into (1) Mural, where the wall of the tube is involved; (2) Extra-mural. Those of nervous origin whether central or peripheral are best treated separately.

It is important to remember that "dysphagia," or difficulty in swallowing, includes three conditions: (1) Obstructive difficulty; (2) painful difficulty; (3) paralytic difficulty.

In taking the history care should be taken to elucidate which of these three conditions exists or predominates.

The mouth.—I. *Deformities and Defects.* (*a*) Congenital: Cleft palate. The difficulties in nutrition in these cases both from the sucking and swallowing point of view are too well known to require any further allusion. Macroglossia. (*b*) Acquired: (1) Perforation of the palate, usually syphilitic in origin; (2) dental defects (insufficient mastication); (3) complete removal of tongue—gurgling swallowing, the head having to be thrown back. II. *Inflammatory.* When the floor of the mouth is involved the movements of the tongue and also the mylohyoid muscle are hampered, and so the initiation of deglutition interfered with. The dribbling of saliva in these cases is a marked sign, and a great discomfort to the patient. III. *Syphilitic lesions*, except, perhaps, a gumma of the tongue, do not cause interference with deglutition. IV. *Tuberculous and lupus* lesions are comparatively rare, and do not interfere with deglutition. V. *Neoplasms*, except from their actual size, do not influence

deglutition ; but carcinoma when involving the floor of the mouth gives rise to profuse salivation and painful deglutition. VI. *Myasthenia gravis*, a muscular disease affecting deglutition, will operate here as well as upon the subsequent subdivisons of the digestive tube. VII. *Extra-mural.* (1) Fractures of the lower jaw ; (2) wounds, etc.

The oro - pharynx. A. Mural. — I. *Defects and Deformities.* None of these produce any noticeable effect on deglutition. II. *Inflammatory.* Pharyngitis, tonsillitis, Vincent's angina, etc. The effects of all of these on swallowing are well known, while the painful deglutition and altered speech in peritonsillar abscess are characteristic. III. *Syphilitic lesions* produce a certain amount of discomfort, but no real interference with swallowing. If severe, they may subsequently lead to a certain amount of pharyngeal stenosis. IV. *Tuberculous and lupus lesions.* Tuberculous lesions in this region are not common except in the tonsil, and that has no effect on deglutition. *Lupus* of the posterior pharyngeal wall is usually associated with lupus of the nose, naso-pharynx and larynx : it does not interfere with deglutition. V. *Neoplasms*, unless from their size, do not produce any serious difficulty in swallowing. Malignant growths with ulceration are associated with painful deglutition. (*a*) *Benign.* I have seen the following associated with some symptoms : Aberrant thyroid at the base of tongue ; cysts at the base of tongue ; hairy mole involving palate and fauces ; ossification of stylohyoid ligament in tonsil ; enlarged tonsils. (*b*) *Malignant.* Epithelioma of tonsil, pharyngeal wall, or base of tongue. Sarcoma of tonsil. VI. *Foreign bodies.* It is very rare for foreign bodies, unless of exceptionally large size, to become impacted here ; but fish-bones buried in the tonsil are fairly common, and give rise to painful deglutition. VII. *Myasthenia gravis* will also operate here.

B. Extra-mural.—(1) Retro-pharyngeal abscess; (2) neoplasms of vertebral column; (3) aneurism (internal carotid); (4) fibro-sarcoma of naso-pharynx; (5) large simple choanal polypus.

In the laryngo-pharynx. Mural.—I. *Deformities and Defects. Imperforate pharynx.* In these cases the pharynx ends blindly, and either the upper end of the œsophagus may be represented by a fibrous cord attached to the pharynx, or the œsophagus may have no connection with the pharynx, and open into the trachea as high as the third ring or even into the left bronchus. II. *Inflammatory.* Streptococcal ulceration may occur here; but as a rule any effects on deglutition are masked by the dyspnœa dependent on associated œdema of the larynx. III. *Syphilitic.* Ulcers or gummata of the posterior pharyngeal wall or vestibule of the larynx may produce some discomfort in deglutition, but the effects on respiration and the voice are more prominent. IV. *Tuberculous and Lupus.* Tuberculous lesions of the larynx produce painful deglutition, especially when situated on the vestibule of the larynx or the posterior surfaces of the arytenoids. Painful deglutition may be the most marked symptom, and later actual obstruction may occur. The diagnosis from malignant disease is often most difficult. Lupus in this region may proceed to almost complete destruction of the epiglottis (a favourite site) without any effect on deglutition beyond a slight sense of discomfort. V. *Neoplasms* are practically all laryngeal. *Benign* produce respiratory and not deglutition symptoms. *Malignant.* Epitheliomais very common. Sarcoma rare in this region. The favourite site of epithelioma is the posterior surface of one or other arytenoid, less frequently one of the pyriform fossæ. The lateral wall of the pharynx and the vestibule of the larynx are subsequently involved through extension. The growth occurs much more frequently in

men than in women. Owing to its position painful deglutition is an early and very important symptom, respiratory and voice disturbances occur later, and subsequently actual obstruction to deglutition is superimposed. An early involvement of the lymphatic glands always occurs. This is in marked contradistinction to epithelioma of the vocal cords (intrinsic), where glandular involvement is very rare. VI. *Foreign bodies*, unless very large, either pass through this region to be held up in the hypo-pharynx, or are impacted in the larynx, producing respiratory symptoms. VII. *Myasthenia gravis* also affects the muscles of this subdivision of the digestive tube.

Hypo-pharynx.—I. *Foreign bodies.* The great majority of ingested foreign bodies are impacted either here or at the level of the superior aperture of the thorax. I have removed lumps of meat, fish and meat bones, coins, rings and other trinkets from this region. When opaque to X-rays they are seen on skiagraphy to lie in the coronal plane, as against the sagittal plane in the larynx or trachea. It is important to remember that an impacted foreign body does not as a rule cause complete obstruction to deglutition. II. *Pharyngeal diverticulum.* This is a pulsion hernial protrusion of the mucous membrane, which appears between the lower oblique fibres and the transverse or crico-pharyngeus portion of the inferior constrictor muscle of the pharynx. It commences posteriorly in the middle line, but as a rule then deviates to one or the other side, usually the left. They are often associated with œsophageal obstruction as an exciting cause. The fundus of the sac may obstruct the œsophagus through pressure lower down in the neck. The main symptom is the return of undigested food some time after a meal. A swelling in the neck can usually be felt, and pressure on this determines the return of food. A certain amount of obstructive difficulty is usually

present. Skiagraphy with barium paste will definitely show the presence of a diverticulum. III. *Epithelioma* in this region is quite common, and is practically confined to women. I have seen it in women under 30 years of age, and as is usual in carcinoma appearing elsewhere at an early age, it is very rapid in its growth and fatal termination. Obstructive difficulty is the symptom in these cases. On examination by the indirect method with the laryngeal mirror the growth is invisible until a late and advanced stage, when it has risen out of the hypo-pharynx. The only suspicious sign to be seen by the laryngeal mirror in the early stage is an increase of mucus and saliva at the entrance to the hypo-pharynx and in the pyriform fossæ. Examination by the direct method is the only means of making an early diagnosis, combined with the removal of a portion for pathological investigation. X-ray screening with barium paste or capsules is in my experience unreliable in this region.

In the œsophagus. — A. Mural. I. *Deformities and Defects.* Congenital strictures and webbing. Imperforate œsophagus. Cicatricial strictures following the swallowing of corrosive fluids. The sites in order of frequency are: (*a*) crossing of left bronchus (level); (*b*) hypo-pharynx; (*c*) diaphragmatic opening. II. *Inflammatory*, starting from the trauma of a passing foreign body. III. *Syphilis.* This condition is rare, but gumma, ulceration or the resultant fibrosis with stricture may be found. IV. *Tuberculosis.* This is rare, but it occurs from infection by swallowed sputum; it is usually terminal. V. *Neoplasms.* Benign are rare. Mucous polypus, papilloma, fibroma, angioma, varices, and aberrant thyroid have been recorded. *Malignant.* Sarcoma is rare, and Epithelioma is fairly common, occurring in both sexes; the usual sites in order of frequency are: (1) Middle third, more prevalent in women; (2) Lower

third, more prevalent in men. VI. *Foreign bodies.* The usual sites of impaction are : (1) At the level of the thoracic entrance ; (2) at the level of the aortic narrowing ; (3) at the level of the left bronchus. VII. *Myasthenia gravis* may possibly act here.

B. Extra-mural.—It is necessary here to consider separately the three subdivisions of the œsophagus. *Cervical :* Carcinoma of thyroid ; cysts and simple tumours of thyroid ; pharyngeal diverticulum ; enlarged glands ; dislocation backwards of the sternal end of clavicle. *Thoracic :* Aneurism ; mediastinal growths ; enlarged glands ; pericarditis. *Abdominal :* Enlargement of the left lobe of the liver.

Of nervous origin.—These lesions are naturally grouped into the two main types—organic and functional, the former being subdivided into central and peripheral. **A. Organic.**—I. *Central in origin :* Bulbar paralysis ; syringomyelia ; disseminated sclerosis ; Landry's paralysis ; tabes (rare). In all of these the whole of the digestive tube from the mouth to the cardia is affected, and both sensory and motor fibres are involved. II. *Peripheral.* Post-diphtheritic paralysis. In these cases the muscles of the palate and pharynx are those usually involved, but the œsophagus may sometimes be implicated. The same results are occasionally seen after scarlet fever and streptococcal infections. Facial paralysis only produces difficulty in mastication. In my experience unilateral paralysis of the ninth, tenth, eleventh and twelfth cranial nerves has no appreciable effect on deglutition (*e.g.* Trotter's syndrome). **B. Functional.**—Functional disorders may affect any of the previously mentioned subdivisions of the digestive tube. (1) Inability to start the bolus on its way from the mouth (unable to take pills, "small swallow," etc.). (2) Inability to engage the bolus by the muscles of the isthmus faucium

and to contract the pharyngeal constrictors. This is associated with the symptom of "lump rising in the throat." (3) Sense of obstruction in the hypo-pharynx due to lack of relaxation of the crico-pharyngeus muscle at the correct moment or to its over-action. (4) Paresis of œsophageal muscle.

A word must here be said about the condition commonly known as cardio-spasm. If the presence of a sphincter be established, then the term explains itself as a spasm of that sphincter. Chevalier Jackson maintains that it is not a spasm but a flaw in the reflex relaxation of the "pinch cock" crural fibres at the diaphragmatic aperture. In some of these cases marked dilatation of the œsophagus ("œsophagocele") occurs above the obstruction.

The deglutition disorders which occur in rabies and occasionally tetanus are probably of toxic central origin.

The sensory neuroses of the pharynx deserve mention here. It is my experience that in most functional cases hypo-æsthesia is combined with paræsthesia, so that the examination of the pharynx and larynx is particularly easy. Hyper-æsthesia is very evident in alcoholic cases, and the laryngologist has the truth of the perverted proverb, "The wages of gin is breath," forcibly brought home to him. Attempts at concealment by musk in women and onions in men do not improve the situation.

To summarise with a few general statements. *Painful difficulty* ceases at the level of the œsophagus, and is, as a rule, accurately located by the patient. Three conditions should be thought of: (1) Foreign body; (2) tuberculous larynx; (3) epithelioma of the larynx. In the first the history of ingestion of the foreign body is always given by the patient. To eliminate the second careful examination of the chest supplemented by X-rays and inquiry as to hæmoptysis is essential. Conditions of the mouth and

oral-pharynx are easily visible. *Obstructive difficulty*, when situated in the œsophagus, is referred by the patient to one or other end; obstruction above this level by the sufferer is as a rule accurately located.

Early diagnosis is essential. An operable case soon becomes inoperable and hopeless. The policy should be "Look and see," not "Wait and see."

Reviews of Books.

An Index of Prognosis and End-Results of Treatment. By various Writers. Edited by A. RENDLE SHORT, M.D., B.S., B.Sc. Lond., F.R.C.S. Eng. Third Edition, revised and enlarged. Bristol: John Wright & Sons Ltd. 1922.—We heartily welcome the appearance of this new edition of a work so well known and widely appreciated, which has already proved itself an invaluable guide both as to prognosis and as to the value of different forms of treatment. In the seven years since the first edition was published much has been learnt, especially from the results of the Great War. The work has now been carefully revised and in many parts rewritten, and a new section on Ophthalmology added. Laborious as the compilation of the original work was, the new statistics available and fresh means of prognosis have added immensely to the duties of the editor in the present edition.

Hæmatology in General Practice. By A. KNYVETT GORDON, M.B., B.Ch., B.A. Pp. vii., 100. London: Baillière, TINDALL & COX. 1923. Price 5s.—The author of this little work has been most successful in the accomplishment of the task he has set out to achieve, viz. to enable the practitioner to utilise the light which a rough examination of a blood film may throw on the diagnosis and prognosis of certain diseases. The chapters on the biology of blood cells, the scope of Hæmatology, the normal blood picture, and the genealogy and pathology of the red and white cells, are concise, definite, and well written, and cannot fail to be of great help both to the student in his ward work and the general practitioner in his every-day routine. The book is well printed, the illustrations are good, and the subject-matter is dealt with in a lucid and intelligible way, which cannot fail to commend it to those for whom it is primarily intended.

The Clinical Examination of the Nervous System. By G. H. MONRAD-KROHN, M.D. (Christiania), M.R.C.P. (Lond.) Second Edition. Pp. xvi., 148. London: H. K. Lewis & Co. Ltd. 1923. Price 6s. net.—Professor Monrad-Krohn is to be congratulated on his signal success in writing a book in a foreign tongue (for it is not a translation, but an English book written by a Norwegian), which needs a new edition within two or three years of its initial publication. Although he has compressed a surprising bulk of information into a small compass, the book is easy to read, and full of practical suggestions and hints. How many British professors of medicine are there who could accomplish a corresponding feat ?

Hernia and its Radical Cure. By J. HUTCHINSON, F.R.C.S. Eng. Pp. xiii., 264. London: Oxford Medical Publications. 1923. Price 12s. 6d. net.—While this book deals with hernia chiefly from its practical operative point of view, the author expresses very definite opinions on the present-day theories of the origin of this disability, and brings out numerous points in treatment and prognosis not always within the knowledge of those whose experience is not large. He condemns the routine practice of one operation for one type of hernia as being, in some cases, unsatisfactory, and likely to bring disrepute upon methods which, suitably applied, give excellent results, with, at the utmost, 10 per cent. only of failure to cure radically ; while some modern innovations in radical cure which savour more of advertisement than advancement the author deals with in no uncertain voice. The rarer forms of hernia are all adequately dealt with, while to strangulation, its diagnosis and treatment is assigned a considerable portion of the book, giving many valuable details of the difficulties which the surgeon of wide experience has met and overcome in this condition. Any attempt to describe the varieties and application of trusses has been wisely avoided. This book offers a useful survey of the radical cure of hernia, pointing out its difficulties and the need for careful selection of methods and attention to details.

Surgical "Don'ts" (and "Do's"). By C. HAMILTON WHITEFORD, M.R.C.S. Pp. 46. London: Harrison & Sons Ltd. 1923. The author deserves the thanks of surgeons for broadcasting rules of professional ethics and etiquette otherwise only learnt by years of often painful experience. He warns us that a surgeon and his scalpel should not be inseparable. The work resounds with a fine frank moral note calculated to inspire a lofty ideal in the profession, and to increase the admiration and confidence of the laity whom it serves.

Problems in Tuberculosis. By Sir JAMES KINGSTON FOWLER, K.C.V.O., M.A., M.D. Pp. ix., 64. London: Oxford Medical Publications. 1923. Price 5s. net.—This excellent little book, from the pen of one of the greatest authorities on tuberculosis, is full of interest from cover to cover. Kingston Fowler is a keen opponent of tuberculin, and and has some cogent remarks to make *à propos* of tuberculosis dispensaries. "If some tuberculosis dispensaries had been more concerned with contacts and less with tuberculin things might have been different." On the other hand, he has much to say in praise of Otto Walther and Marcus Paterson in relation to treatment by auto-inoculation through the medium of graduated labour. He has some sound remarks to make on the subject of duration of treatment in curable cases. There is much time and money spent to no purpose in giving short spells of treatment to cases that can never materially benefit, and the treatment of hopeful cases is of necessity curtailed in consequence. He puts the problem in a nutshell: "For income 5 per cent. on £100 is better than no dividend on £200." The author has some damaging criticisms to make on mistakes in diagnosis and notification which are very suggestive. The chapters on organisation of the tuberculosis settlement and advice to tuberculous patients with regard to their future are illuminating, full of interest and very sound. A not inconsiderable merit of the book is its brevity; it can be read in a couple of hours, and there is no time for interest to flag.

Hæmorrhoids, their Etiology, Prophylaxis and Treatment by Means of Injections. By ARTHUR S. MORLEY, F.R.C.S. Eng. Pp. ix., 114. London: Oxford Medical Publications. 1923. Price 6s.—Mr. Morley is convinced that the usual operations performed for the cure of hæmorrhoids are rarely necessary, and that treatment by interstitial injections should largely replace those operations. The injection treatment saves the patient from lying up, from having an anæsthetic, from considerable pain and from much inconvenience and expense. The author gives a full account of the technique of the procedure and of its indications, contra-indications and results. It is a curious thing, if others can obtain as good results by this treatment as the author, that the method has not gained greater popularity. Is it an example of unreasonable conservatism? It is obvious that the method is more troublesome to the surgeon than one operation, for he has to make the injections four to six times in each case. We hope that fact has not been allowed to influence opinion unduly. We think rather that the conservatism is based on the fact that the ordinary operative treatment of hæmorrhoids yields very satisfactory results,

results comparing favourably with those obtained from any surgical operation in whatever field. Hence but little desire is felt to try newer methods, the preference being to bear the ills of present methods rather than fly to others that may attend a newer and at first sight less radical method. After reading Mr. Morley's book and other articles on the subject, such as Mr. Dudley Wright's pamphlet of some ten or twelve years ago and Sir James Goodhart's article in *The Practitioner* of 1914, we cannot but feel that the injection treatment of hæmorrhoids has a great future, and we highly commend the clear account of it here given.

An Index to General Practice. By A. CAMPBELL STARK, M.B., B.S. Pp. x., 181. London: Baillière, Tindall & Cox. 1923. Price 5s. net.—This book is not an encyclopædia but a medical experience unrolled. "Antiseptics," "Books," "Clinical Observation," Dr. Stark deals with work as single hands encounter it. Here is the craftsman, ingenious in device, whether to keep records or to specialise; and the discriminating reader who, brief himself, can tell the pithiest author on each topic. Dr. Stark's *forte* is Materia Medica, and his formulæ will be scrutinised for alopecia, common colds and puerperal sepsis. But he has no weak bias for drugs and recognises that treatment lags behind diagnosis. We miss the old latinity from his prescriptions and could spare a dead fly of acerbity in his wisdom. The author disputes the right of the schools to engross education and dictate opinion. To general practice, too, it belongs—and this gives consistency and aim to his book—to shape the novice, hold the field of endeavour and make gains for knowledge.

A System of Surgery. Edited by C. C. CHOYCE, C.M.G., C.B.E., M.D., B.Sc., F.R.C.S. Pathological Editor, J. MARTIN BEATTIE, M.A., M.D., C.M. In three volumes. Second Edition. London: Cassell & Co. Ltd. 1923. £6 nett.—It has long been an open secret that a second edition of this standard text-book of systematic surgery was in preparation; it may be said at once that the inevitable delay in its appearance is amply compensated for in the completeness of the revision. Nothing seems to have been overlooked in the attempt to provide a complete and up-to-date exposition of British surgery. The majority of the contributors are the same as were responsible for the first edition, and the names of the newcomers are a sufficient guarantee of the maintenance of the high standard then reached. Where all the sections are so complete it would be invidious to select one or more for special mention. It may be stated with confidence that the reader in search of adequate information on any subject within the compass of

the work is not likely to be disappointed. To give an example, Nitch's contribution on gangrene contains an account of Leriche's work on the prophylaxis of senile and other forms of gangrene by stripping the sympathetic coat from the wall of the artery. Many similar examples of this completeness might be quoted. A noteworthy feature of great value is the way in which a fair summary of present-day opinion on subjects of a controversial nature is presented to the reader, no attempt being made to stress unduly the writer's personal views. No better example of this can be given than Hey Groves's section on fractures, to which the Bristol reviewer turns with natural curiosity. This difficult subject is handled in an admirable way, and no attempt is made to exaggerate unduly the merits of the newer methods of treating fractures at the expense of those which, if under a cloud at the moment, have served us well in the past. At the same time, the reader in search of the latest operative or other treatment will find here all he wants. In congratulating Editor and contributors on the success of their efforts, we must not omit to pay tribute to the publishers for their share. The printing and general get-up of the volumes are beyond praise, and the illustrations, both half-tone and coloured, are beautifully produced. In brief, the three handsome volumes thoroughly deserve to keep the place they have won as a standard text-book of systematic surgery as British surgeons see it.

Practical Anæsthetics. By CHARLES F. HADFIELD, M.B.E., M.A., M.D. Pp. ix., 244. London: Baillière, Tindall & Cox. 1923. Price 7s. 6d. net.—Dr. Hadfield's book is an extremely useful addition to that small library of anæsthetic text books for students. In these days of packed curricula the size of a text book has an important bearing on its use and popularity, and this small manual of 240 odd pages has succeeded in getting all the essentials of practical anæsthesia within this modest limit. We therefore commend this book both for its price and contents to all students and practitioners.

Orthopedic Surgery. By Sir ROBERT JONES, K.B.E., C.B., F.R.C.S., and ROBERT W. LOVETT, M.D., F.R.C.S. Pp. xv., 699. London: Oxford Medical Publications, 1923. Price 42s. net.—A book written by the leading surgeons in this speciality of this country and of the United States is certainly one which will command immediate interest and become an authoritative book of reference. The authors apologise for the use of the term orthopedic, and promise to use it as little as possible, but they had not the courage to abandon it in favour of the simpler term "Surgery of the Bones and Joints." The work is simple and practical, and as such it will be valued as representing the

views of the greatest experts on matters of treatment. There is no attempt to make the work inclusive of all that has been written on the subject. It is a plain statement of the authors' own views with occasional reference to some idea or method which has their approval, even though they themselves have not practised it. The work opens with a general discussion on Joints, their function and disabilities, and this leads on to a series of chapters on traumatic tuberculosis and other diseases of the special joints. Coxa plana is included in the section on traumatic affections of the hip and treatment by rest and occasional fixation is advised for it. In injuries of the knee joint the special operations devised by Edwards and Hey Groves for the repair of the lateral and crucial ligaments respectively are fully described and figured. The internal derangements of the knee are dealt with on the usually accepted principles, and it is advised that a torn cartilage should be removed through a small lateral incision, taking away the whole meniscus. We think that more space might have been given to the method of dealing with cases of doubtful nature, or of how to proceed when the lateral incision discloses a normal cartilage. The patella splitting method is not mentioned, although it is being used more and more as an exploratory route in this country, and that chiefly on the recommendation of one of the authors of this book. The treatment of stiff joints by manipulation and splinting is dealt with at some length, whilst the section on arthroplasty is very short and non-committal. Tuberculosis of the joints and spine occupies about 120 profusely illustrated pages. This section is practical and authoritative, and has the distinctive advantage of showing two distinct opinions about the details of treatment, Jones advocating the Thomas appliances with fixed traction and Lovett the more mobile system of weight and pulley. The brace, frame and plaster methods of spinal immobilisation are fully described, and the osteoplastic operations of Hibbs and Albee are epitomised and definitely recommended for adoption in the majority of adult cases. In the treatment of deformities of the leg bones we are rather surprised to find that the osteoclast is still recommended, and two varieties of this machine are figured. The new growths of bone are described in seven pages, and this short summary is intended for assistance in connection with other disabilities of the joints. Recent fractures are not described, but there is a short chapter on mal-united fractures, in which the use of Thomas's wrench, the abduction frame and the malleable iron splints is introduced. In the treatment of spastic paralysis the authors give the first place to muscle re-education, preceded if necessary by tenotomies or tendon lengthening and transplantation. In

describing the treatment of infantile paralysis the prevention of deformities by early rest and splinting and the treatment of late deformities by muscle transplantation are given very fully and are illustrated well. The hazardous and difficult operation of lengthening a shortened femur is given much more prominence than it deserves. Congenital dislocation of the hip is fully described in regard to its anatomy and manipulative treatment. Open operation is mentioned with so little detail as to leave the impression that it is hardly worth while considering, and osteotomy of the femoral neck in adults is recommended as a very exceptional measure. The last section of the work deals with club foot, static deformities of the feet, scoliosis and the principles of apparatus. The wrench, retentive apparatus and muscle education are the dominant notes in all these chapters. Finally, we should like to summarize our impressions of the book as a whole. It would be impertinent to say that the considered opinions of two master minds are anything but good—it is only a question whether it is as good as we might have expected—if it falls short of the ideals inspired by personal contact with the authors we suppose that this can hardly be a fault charged against the book. A printed sermon never conveys the message given by the living man.

Urgent Surgery. By FELIX LEJARS. Third English Edition. Translated by WILLIAM S. DICKIE and ERNEST WARD. Pp. xv., 808. Bristol: J. Wright & Son Ltd. 1923. Price 63s.—The third English edition of this valuable book represents the eighth French edition, and instead of being in two volumes as previously, we have the whole work here under one cover. It is a book not only to read, but also to possess. Its great virtue for the surgeon lies in the excellent and full accounts it gives of the means of dealing with the rarer emergencies, some of which are scarcely at all described elsewhere. Moreover, it is very fully illustrated, and the fact that we are seeing surgery through French eyes gives a touch of freshness and occasionally of novelty. The changes in this edition are not very obtrusive. They are principally concerned with the newer methods of treatment which have been taken over from military into civilian surgery, as for extensive wounds of soft parts, hemorrhage, ligature of vessels, and fractures.

The "Nauheim" Treatment of Diseases of the Heart and Vessels in England. By LESLIE THORNE THORNE, M.D. Sixth Edition. Pp. vii., 232. London: Baillière, Tindall & Cox. 1923. Price 7s. 6d. net.—This book is written to demonstrate the use of these baths, and to show that they may just as well be given in nursing homes or in the patient's own

house as at Nauheim. We learn on page 14 that in cases of lowered blood pressure the arterial tension may be raised by immersion in a "Nauheim" bath, whereas in cases of increased arterial tension the blood pressure is lowered. Wonderful results are given in decreasing cardiac dilatation, and the author quotes examples where the cardiac dullness at the nipple level has been reduced from 9 to 4½ inches. We note that the author relies on percussion for outlining the cardiac dullness, and states that the results of percussion agree with those of X-ray findings, whereas the modern cardiologist owns that percussion is very inaccurate. On page 5 it is stated that auricular or ventricular premature contractions show the existence of impaired conductivity; but of this no proof is offered by the author. On page 65 Case II. is shown to have an increased a–c interval, which is stated to have become normal after treatment, but careful measurements of tracings 12 and 13 show that the same lengthening of the a–c interval existed after treatment as before. Figures 54, 57, and 64 are stated to be examples of auricular premature contractions, but in reality they are ventricular in origin. The author states that there is no fear of sudden death in angina pectoris unless there be dilatation, yet we have no doubt that many cases of angina die without this condition. The author is evidently a great enthusiast for the use of these baths.

Editorial Notes.

The Centenary Celebrations of the "Lancet."

THE centenary celebrations of the *Lancet* now in progress mark something greater even than the hundredth birthday of the *Lancet*. It is the centenary not only of one of the greatest of medical journals, but also of medical journalism. The whole history of the *Lancet* is a wonderful example of the possibilities of honest and vigorous individual effort. When Thomas Wakley founded his paper, his main purpose was to bring into the light of publicity certain hole-and-corner practices in the profession which he had but lately joined. His resources consisted of a modest general practice in the neighbourhood of the Strand; a clear insight into the selfish and dishonest policy of a privileged section of the medical profession of his day; and an unrivalled capacity for saying what he thought, stimulated by a painful personal experience of injustice and untrammelled by fear of consequences. On this slender foundation he builded better than he knew. The history of his struggles, and of the succession to his policy of those who have followed him, is set forth in the centenary number of the *Lancet*, which every medical man should possess, not only for present reading, but also for future reference. Its policy is now, as it always was, the promotion of honesty in the teaching and practice of medicine. Unsurpassed among medical journals, it remains an example of Editorial acumen and of medical matters written in pure and intelligible English, while it is the model on which many of the most successful medical weeklies have been fashioned. Here it is enough that we offer our congratulations to those now in charge of our illustrious

contemporary, who maintain so worthily those traditions of honesty and veracity on which Wakley founded his venture; for it is a fact, that in medical journalism the *Lancet* maintains its leading position. Those who have been privileged to work for the *Lancet* will bear witness to the consideration always received from those in charge. Our congratulations are therefore no empty form; they carry with them an acknowledgment of the immense debt which the medical profession in general and that of the English speaking races in particular owes to the *Lancet*, and a belief that the tradition of fearless independence, one of the chief sources of its unequalled influence, will be maintained in the future.

* * * * *

Service at the Cathedral.

At the invitation of the Dean of Bristol (the Very Rev. E. A. Burroughs, D.D.), a service was held in the Cathedral on October 21st, the Sunday after St. Luke's Day, at 3.30 p.m.

In spite of the exceptional rain that fell during the afternoon, a large number of medical men resident in Bristol and the neighbourhood attended the service. Many representatives of the nursing profession from the various hospitals in Bristol, private nursing homes, the District Nursing Association and private nurses were also present. The officiating clergy were the Dean, the Sub-Dean (Rev. Canon Alford), the Precentor (Rev. J. M. D. Stancomb), and the Rev. H. A. Watts.

The first lesson (Ecclesiastes xviii. 1–14) was read by Mr. F. Richardson Cross, and the second lesson (St. John xvi.) by the Rev. Canon Alford. The anthem was "Ho, every one that thirsteth, come ye to the waters and buy," from Mendelssohn's *Elijah*.

The sermon was preached by the Dean, who took as his text Hebrews iv. 13: "Neither is there any creature that is not manifest in his sight: but all things are naked and opened unto the eyes of him with whom we have to do."

The general appreciation expressed of this special service for the medical profession has been such that we understand that the Dean has promised to reserve the Sunday nearest to St. Luke's day for a similar service next year. We trust that so excellent an observance may long continue.

Obituary.

EDWARD RATCLIFFE HOLBOROW, M.B., B.S. Lond., F.R.C.S. Ed.

On August 18th in a very rough sea at Weston-super-Mare two ladies bathing were in grave danger, and Dr. Holborow was drowned in attempting to rescue them. He had never fully recovered health and strength undermined in air war service; yet unequal to the strain and stress involved by his self-sacrificing bravery, it was characteristic of the man to respond to the call and ignore the odds against him, which he was so physically unfitted to combat.

Holborow's family for generations have belonged to the Badminton country. He was educated at the University of Bristol, where he won the Lady Haberfield Prize, and graduated as M.B. and B.S. at the London University in 1909, taking the F.R.C.S. Ed. in 1917.

Holborow was House Surgeon at Somerset Hospital, Cape Town, and also at the Pretoria Hospital, Transvaal.

On the outbreak of war he joined the R.A.M.C. and served in Gallipoli, and after the evacuation thereof on the western front in France. He was subsequently Surgical Specialist at the Fovant Military Hospital on Salisbury Plain.

On demobilisation he settled in practice at Weston-super-Mare, where he was appointed Poor Law Medical Officer.

Holborow's quiet charm of manner and amiability endeared him to all his colleagues and patients of all classes, and made many friends. The admiration of his fellow-townsmen for his gallantry was marked by a public funeral, and the widespread sympathy for his widow and family of two very young children.

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